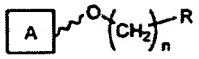
CLMS PTO

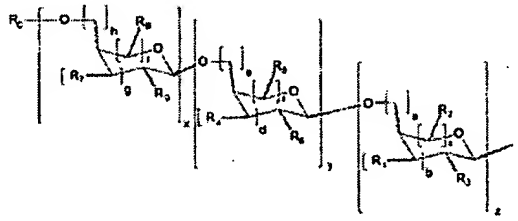
JL

09/18/2003

1. A compound having the structure:

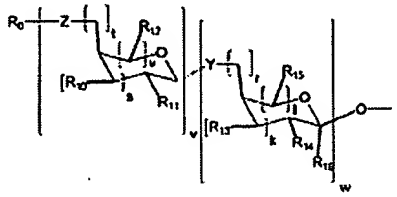


wherein R is hydrogen; substituted or unsubstituted alkyl; alkenyl; aryl; $-CH_2CH(CO_2R')(NHR'')$, wherein R' or R'' are each indpendently hydrogen, protecting group, substituted or unsubstituted alkyl, a linker, aryl, peptide, protein or lipid; or NHR''', wherein R''' is a protein, peptide, or lipid linked to N directly or through a crosslinker; wherein n is 0-8; and wherein A is a carbohydrate domain having the structure:



wherein a, b, c, d, e, f, g, h, i, x, y and z are independently 0, 1, 2 or 3, with the proviso that x, y and z are not simultaneously 0; wherein R_0 is hydrogen, a linear or branched chain alkyl, acyl, arylalkyl or aryl group; wherein R_1, R_2, R_3, R_4, R_5, R_6, R_7, R_8 and R_9 are each independently hydrogen, OH, OR^i, NH_2, $NHCOR^i$, F, CH_2OH, CH_2OR^i, a substituted or unsubstituted linear or branched chain alkyl, (mono-, di- or tri)hydroxyalkyl, (mono-, di- or tri)acyloxyalkyl, arylalkyl or aryl group; wherein R^i is

hydrogen, CHO, $COOR^{iii}$, or a substituted or unsubstituted linear or branched chain alkyl, arylalkyl or aryl group or a saccharide moiety having the structure:



wherein Y and Z are independently NH or O; wherein k, l, r, s, t, u, v and w are each independently 0, 1 or 2; wherein R_{10}, R_{11}, R_{12}, R_{13}, R_{14} and R_{15} are each independently hydrogen, OH, OR^{iii}, NH_2, $NHCOR^{iii}$, F, CH_2OH, CH_2OR^{iii}, or a substituted or unsubstituted linear or branched chain alkyl, (mono-, di- or tri)hydroxyalkyl, (mono-, di- or tri)acyloxyalkyl, arylalkyl or aryl group; wherein R_{16} is hydrogen, COOH, $COOR^{ii}$, $CONHR^{ii}$, a substituted or unsubstituted linear or branched chain alkyl or aryl group; wherein R^{iii} is hydrogen, CHO, $COOR^{iv}$, or a substituted or unsubstituted linear or branched chain alkyl, arylalkyl or aryl group; and wherein R^{ii} and R^{iv} are each independently H, or a substituted or unsubstituted linear or branched chain alkyl, arylalkyl or aryl group, with the proviso that if A is KH-1, N3, Globo-H, glycophorin, Tn, TF, STN, (2,3)ST, 2,6-STn or Le^y, and A is α-O-linked, then n is at least 1.

2. The compound of claim 1, wherein R is allyl.

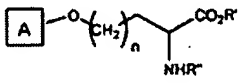
3. The compound of claim 1, wherein n is 1 and R is allyl.

4. The compound of claim 1, wherein n is 2, and R is allyl.

5. The compound of claim 1, wherein R is NHR^{vi}, and wherein the protein R^{vi} is KLH or Bovine Serine Albumin, whereby said compound is a glycoconjugate.

6. The compound of claim 1, wherein R is NHR'", and wherein the lipid R'" is PamCys, whereby said compound is a glycoconjugate.

7. The compound of claim 1, wherein R is $CH_2CH(CO_2R')(NHR")$ and the resulting glycopeptide has the structure:



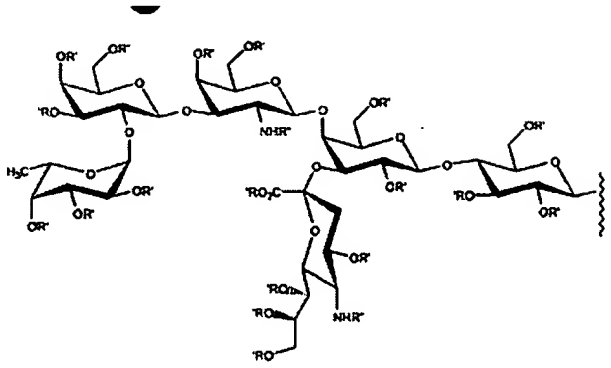
8. The compound of claim 7 wherein n is 3.

9. The compound of claim 7, wherein R' and R" are each hydrogen or a protecting group.

10. The compound of claim 9, wherein R' and R" are each protecting groups independently selected from the group consisting of Fmoc, acetyl, Boc, *t*-butyl and TSE.

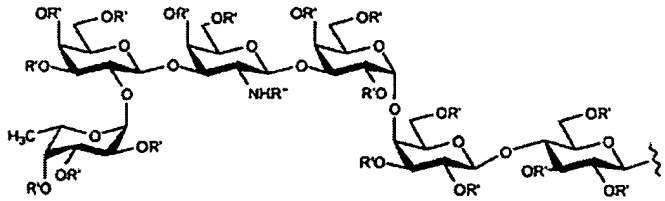
11. The compound of claim 1, 4, 7 or 8, or the glycoconjugate of claim 5 or 6, wherein the carbohydrate determinant is selected from the group consisting of Globo-H, fucosyl GM1, KH-1, glycophorin, N3,Tn, TF, STN, (2,3)ST, 2,6-STn, and Le^y.

12. The compound or glycoconjugate of claim 11, wherein A is the carbohydrate determinant fucosyl GM1 having the structure:



wherein each occurrence of R' is independently hydrogen or a protecting group; and wherein each occurrence of R" is independently hydrogen or a nitrogen protecting group.

13. The compound or glycoconjugate of claim 11, wherein A is the carbohydrate determinant Globo-H having the structure:



wherein each occurrence of R' is independently hydrogen or a protecting group, and wherein R" is hydrogen or a nitrogen protecting group.

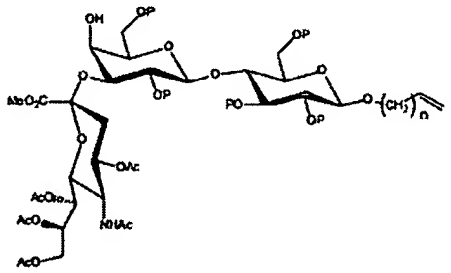
14. A method for the synthesis of complex carbohydrates comprising:

(a) providing a carbohydrate acceptor having a reducing end alkenyl group;

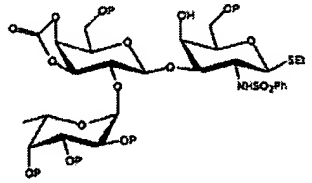
(b) providing a suitable donor compound; and

(c) coupling said donor and acceptor under conditions to generate an alkenyl glycoside.

15. The method of claim 14, wherein the step of providing a carbohydrate acceptor having a reducing end alkenyl group comprises providing an acceptor having the structure:

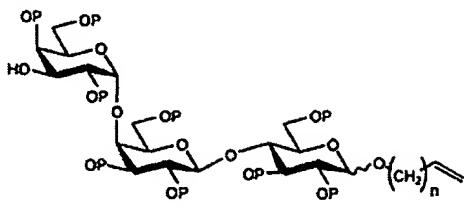


wherein P is a protecting group and n is 0-8, and wherein the step of providing a suitable donor compound comprising providing a donor having the structure:

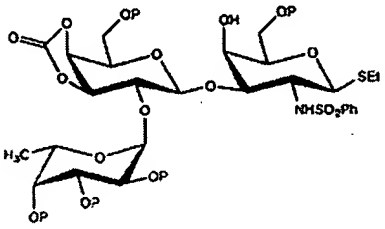


wherein n is 0-8, and wherein P is a protecting group.

16. The method of claim 14, wherein the step of providing a carbohydrate acceptor having a reducing end alkenyl group comprises providing an acceptor having the structure:



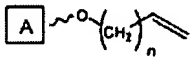
wherein P is a protecting group and n is 0-8, and wherein the step of providing a suitable donor compound comprising providing a donor having the structure:



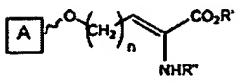
wherein n is 0-8 and P is a protecting group.

17. A method for the synthesis of a glycoamino acid comprising the steps of:

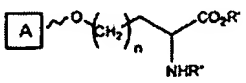
(a) providing an alkenyl glycoside having the structure:



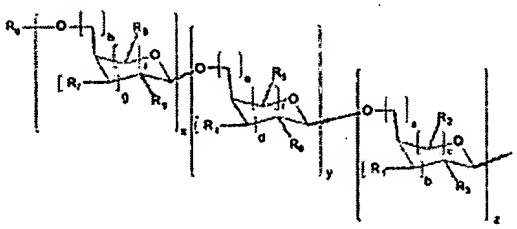
and reacting said alkenyl glycoside under suitable conditions to generate an enamide ester having the structure:



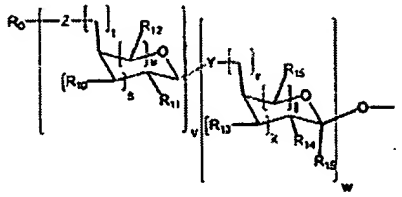
(b) reacting said enamide ester under suitable conditions to generate a glycoamino acid having the structure:



wherein, for each of the structures above, n is 0-8, wherein A is a carbohydrate domain having the structure:



wherein a, b, c, d, e, f, g, h, i, x, y and z are independently 0, 1, 2 or 3, with the proviso that x, y and z are not simultaneously 0; wherein R_0 is hydrogen, a linear or branched chain alkyl, acyl, arylalkyl or aryl group; wherein R_1, R_2, R_3, R_4 , R_5, R_6 , R_7, R_8 and R_9 are each independently hydrogen, OH, OR^i, NH_2, $NHCOR^i$, F, CH_2OH, CH_2OR^i, a substituted or unsubstituted linear or branched chain alkyl, (mono-, di- or tri)hydroxyalkyl, (mono-, di- or tri)acyloxyalkyl, arylalkyl or aryl group; wherein R^i is hydrogen, CHO, $COOR^R$, or a substituted or unsubstituted linear or branched chain alkyl, arylalkyl or aryl group or a saccharide moiety having the structure:

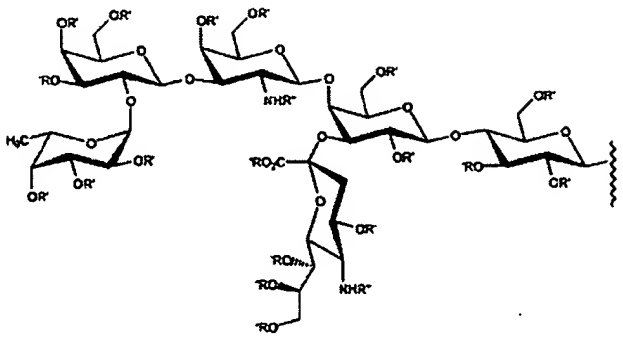


wherein Y and Z are independently NH or O; wherein k, l, r, s, t, u, v and w are each independently 0, 1 or 2; wherein R_{10}, R_{11}, R_{12}, R_{13}, R_{14} and R_{15} are each independently hydrogen, OH, OR^{iii}, NH_2, $NHCOR^{iii}$, F, CH_2OH, CH_2OR^{iii}, or a substituted or unsubstituted linear or branched chain alkyl, (mono-, di- or tri)hydroxyalkyl, (mono-, di- or tri)acyloxyalkyl, arylalkyl or aryl group; wherein R_{16} is hydrogen, COOH, $COOR^{ii}$, $CONHR^{ii}$, a substituted or unsubstituted linear or branched chain alkyl or aryl group; wherein R^{iii} is hydrogen, CHO, $COOR^{iv}$, or a substituted or unsubstituted linear or branched chain alkyl, arylalkyl or aryl group; and wherein R^{ii} and R^{iv} are each independently H, or a substituted or unsubstituted linear or branched chain alkyl, arylalkyl or aryl group;

and wherein for the glycoamino acid structure R' and R" are each independently protecting group or hydrogen.

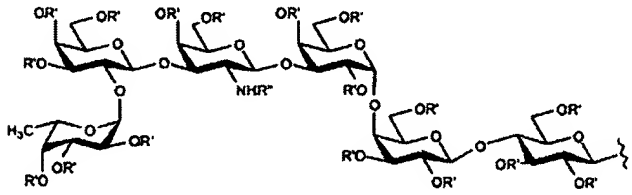
18. The method of claim 17, wherein the carbohydrate determinant is selected from the group consisting of Globo-H, fucosyl GM1, KH-1, glycophorin, STN, (2,3)ST, Le^y, N3, Tn, 2,6-STn, and TF.

19. The method of claim 18, wherein A is a carbohydrate determinant having the structure:



wherein each occurrence of R' is independently hydrogen or a protecting group; and wherein each occurrence of R" is independently hydrogen or a nitrogen protecting group.

20. The method of claim 18, wherein A is a carbohydrate determinant having the structure:



wherein each occurrence of R' is independently hydrogen or a protecting group, and wherein R" is hydrogen or a nitrogen protecting group.

21. The method of claim 17, wherein the step of reacting an alkenyl glycoside under suitable conditions to generate an enamide ester comprises reacting an alkenyl glycoside

first under oxidative cleavage conditions and second under olefination conditions in the presence of base and phosphonate to generate an enamide ester.

22. The method of claim 21, wherein said oxidative cleavage conditions comprise ozonolysis, and wherein the base is tetramethylguanidine.

23. The method of claim 21, wherein said oxidative cleavage conditions are OsO_4 and periodate, or OsO_4 and $Pb(OAc)_4$, and wherein the base is lithium t-butoxide or lithium hexamethyl disilylazide.

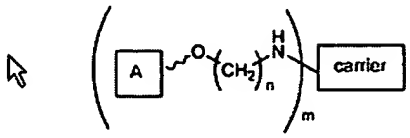
24. The method of claim 17, wherein the step of reacting said enamide ester under suitable conditions to generate a glycoamino acid comprises reacting said enamide ester under hydrogenation conditions and subsequent reaction under deprotection conditions to generate a glycoamino acid.

25. The method of claim 24, wherein said hydrogenation is achieved via asymmetric hydrogenation.

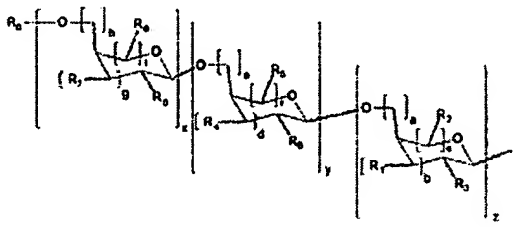
26. The method of claim 25, wherein said asymmetric hydrogenation is achieved by utilizing an ethyl DuPHOS catalyst precursor.

Claims 27 – 32 Cancelled

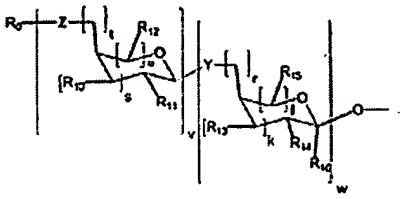
33. A synthetic construct having the structure:



wherein A is a carbohydrate domain having the structure:



wherein a, b, c, d, e, f, g, h, i, x, y and z are independently 0, 1, 2 or 3, with the proviso that x, y and z are not simultaneously 0; wherein R_0 is hydrogen, a linear or branched chain alkyl, acyl, arylalkyl or aryl group; wherein R_1, R_2, R_3, R_4, R_5, R_6, R_7, R_8 and R_9 are each independently hydrogen, OH, OR^i, NH_2, $NHCOR^i$, F, CH_2OH, CH_2OR^i, a substituted or unsubstituted linear or branched chain alkyl, (mono-, di- or tri)hydroxyalkyl, (mono-, di- or tri)acyloxyalkyl, arylalkyl or aryl group; wherein R^i is hydrogen, CHO, $COOR^{ii}$, or a substituted or unsubstituted linear or branched chain alkyl, arylalkyl or aryl group or a saccharide moiety having the structure:



wherein Y and Z are independently NH or O; wherein k, l, r, s, t, u, v and w are each independently 0, 1 or 2; wherein R_{10}, R_{11}, R_{12}, R_{13}, R_{14} and R_{15} are each independently hydrogen, OH, OR^{iii}, NH_2, $NHCOR^{iii}$, F, CH_2OH, CH_2OR^{iii}, or a substituted or unsubstituted linear or branched chain alkyl, (mono-, di- or tri)hydroxyalkyl, (mono-, di- or tri)acyloxyalkyl, arylalkyl or aryl group; wherein R_{16} is hydrogen, COOH, $COOR^{ii}$, $CONHR^{ii}$, a substituted or unsubstituted linear or branched chain alkyl or aryl group; wherein R^{iii} is hydrogen, CHO, $COOR^{iv}$, or a substituted or unsubstituted linear or branched chain alkyl, arylalkyl or aryl group; and wherein R^{ii} and R^{iv} are each independently H, or a substituted or unsubstituted linear or branched chain alkyl, arylalkyl or aryl group;

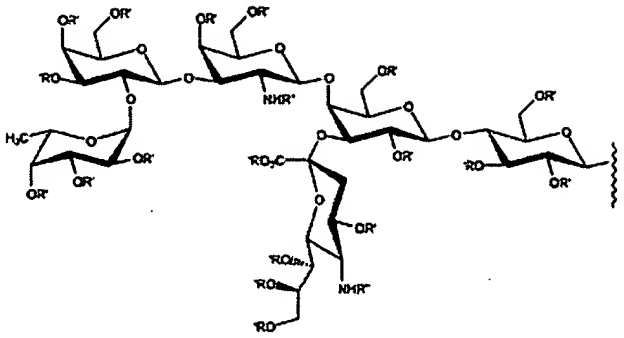
wherein n is 0-8; wherein the carrier a lipid or protein linked directly or through a crosslinker; and wherein m is in the range of 20 to 600.

34. The construct of claim 33, wherein m is in the range of 200 to 600.

35. The construct of claim 33, wherein n is 4.

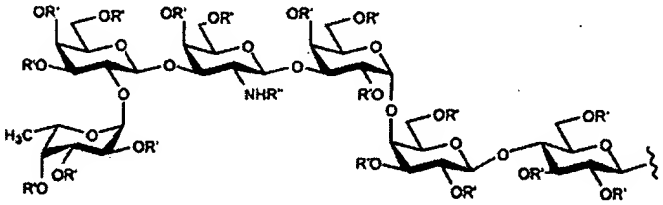
36. The construct of claim 33, wherein the carbohydrate determinant is selected from the group consisting of Globo-H, fucosyl GM1, KH-1, glycophorin, STN, (2,3)ST, 2,6-STn, N3, Tn, TF and Le^y.

37. The construct of claim 33 or 35, wherein A is a carbohydrate determinant, having the structure:



wherein each occurrence of R' is independently hydrogen or a protecting group; and wherein each occurrence of R" is independently hydrogen or a nitrogen protecting group.

38. The construct of claim 33 or 35, wherein A is a carbohydrate determinant, having the structure:



wherein each occurrence of R' is independently hydrogen or a protecting group; and wherein R" is hydrogen or a nitrogen protecting group.

Claim 39 Cancelled

40. A method of treating cancer in a subject suffering therefrom comprising:
administering to a subject a therapeutically effective amount of a compound or construct of claim 1 or 27,
and a pharmaceutically suitable carrier.

41. The method of claim 40, wherein said method comprises preventing the recurrence of cancer in a subject.

42. The method of claim 40 or 41, further comprising co-administering one or more immunological adjuvants.

43. The method of claim 42, wherein at least one of said one or more immunological adjuvants is a saponin adjuvant.

44. The method of claim 43, wherein said saponin adjuvant is GPI-0100.

45. The method of claim 42, wherein at least one of said one or more immunological adjuvants is bacteria or liposomes.

46. The method of claim 45, wherein the immunological adjuvant is Salmonella minnesota cells, bacille Calmette-Guerin or QS21.

47. The method of claim 40 or 41, wherein the cancer is a solid tumor.

48. The method of claim 40 or 41, wherein the subject is in clinical remission, or where the subject has been treated by surgery, has limited unresected disease.

49. A method of inducing antibodies in a subject, wherein the antibodies are capable of specifically binding with tumor cells, which comprises administering to the subject an amount of a compound or construct of claim 1 or 27 effective to induce the antibodies.

50. The method of claim 49, further comprising co-administering one or more immunological adjuvants.

51. The method of claim 50, wherein at least one of said one or more immunological adjuvants is a saponin adjuvant.

52. The method of claim 51, wherein said saponin adjuvant is GPI-0100.

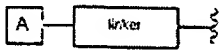
53. The method of claim 49, wherein at least one of said one or more immunological adjuvants is bacteria or liposomes.

54. The method of claim 53, wherein the immunological adjuvant is *Salmonella minnesota* cells, bacille Calmette-Guerin or QS21.

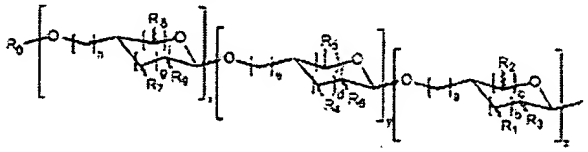
55. The method of claim 49, wherein the subject is in clinical remission, or where the subject has been treated by surgery, has limited unresected disease.

New Claims:

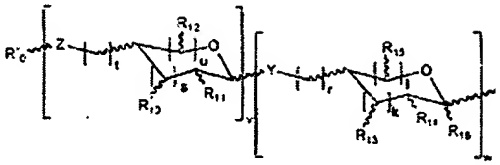
56. A multi-antigenic glycopeptide comprising a peptidic backbone made up of two or more amino acids, wherein each of said amino acids is independently substituted with a glycosidic moiety having the structure:



wherein the linker is a substituted or unsubstituted aliphatic or heteroaliphatic moiety; each occurrence of A is a carbohydrate determinant having the structure:



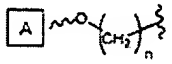
wherein a, b, c, d, e, f, g, h, i, x, y and z are independently 0, 1, 2 or 3, with the proviso that the x, y and z bracketed structures represent furanose or pyranose moieties and the sum of b and c is 1 or 2, the sum of d and f is 1 or 2, and the sum of g and i is 1 or 2, and with the proviso that x, y and z are not simultaneously 0; wherein R_0 is hydrogen, a linear or branched chain alkyl, acyl, arylalkyl or aryl group; wherein each occurrence of R_1, R_2, R_3, R_4, R_5, R_6, R_7, R_8 and R_9 is independently hydrogen, OH, OR^i, NHR^i, $NHCOR^i$, F, CH_2OH, CH_2OR^i, a substituted or unsubstituted linear or branched chain alkyl, (mono-, di- or tri)hydroxyalkyl, (mono-, di- or tri)acyloxyalkyl, arylalkyl or aryl group; wherein each occurrence of R^i is independently hydrogen, CHO, COOR", or a substituted or unsubstituted linear or branched chain alkyl, acyl, arylalkyl or aryl group or a saccharide moiety having the structure:



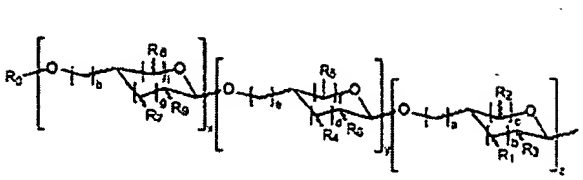
wherein Y and Z are independently NH or O; wherein k, l, r, s, t, u, v and w are each independently 0, 1 or 2; with the proviso that the v and w bracketed structures represent furanose or pyranose moieties and the sum of l and k is 1 or 2, and the sum of s and u is 1 or 2, and with the proviso that v and w are not simultaneously 0; wherein R'_9 is hydrogen, a linear or branched chain alkyl, acyl, arylalkyl or aryl group; wherein each occurrence of R_{10}, R_{11}, R_{12}, R_{13}, R_{14} and R_{15} is independently hydrogen, OH, OR^{iii}, NHR^{iii}, $NHCOR^{iii}$, F, CH_2OH, CH_2OR^{iii}, or a substituted or unsubstituted linear or branched chain alkyl, (mono-, di- or tri)hydroxyalkyl, (mono-, di- or tri)acyloxyalkyl, arylalkyl or aryl group; wherein each occurrence of R_{16} is hydrogen, COOH, $COOR^{ii}$, $CONHR^{ii}$, a substituted or unsubstituted linear or branched chain alkyl or aryl group; wherein each occurrence of R^{iii} is hydrogen, CHO, $COOR^{iv}$, or a substituted or unsubstituted linear or branched chain alkyl, acyl, arylalkyl or aryl group; and wherein each occurrence of R^{ii} and R^{iv} are each independently H, or a substituted or unsubstituted linear or branched chain alkyl, arylalkyl or aryl group;

wherein each occurrence of n is independently 0-9, whereby, if for each occurrence of n, n = 0, at least one occurrence of A has a different structure from other occurrences of A.

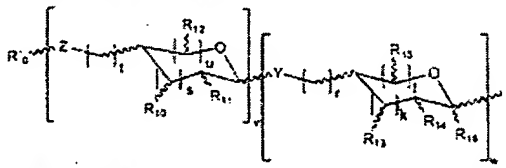
57. The multi-antigenic glycopeptide of claim 56 wherein one or more of said amino acids are substituted with an n-alkyl glycosidic moiety having the structure:



wherein each occurrence of A is a carbohydrate determinant having the structure:



wherein a, b, c, d, e, f, g, h, i, x, y and z are independently 0, 1, 2 or 3, with the proviso that the x, y and z bracketed structures represent furanose or pyranose moieties and the sum of b and c is 1 or 2, the sum of d and f is 1 or 2, and the sum of g and i is 1 or 2, and with the proviso that x, y and z are not simultaneously 0; wherein R_9 is hydrogen, a linear or branched chain alkyl, acyl, arylalkyl or aryl group; wherein each occurrence of R_1, R_2, R_3, R_4, R_5, R_6, R_7, R_8 and R_9 is independently hydrogen, OH, OR^i, NHR^i, $NHCOR^i$, F, CH_2OH, CH_2OR^i, a substituted or unsubstituted linear or branched chain alkyl, (mono-, di- or tri)hydroxyalkyl, (mono-, di- or tri)acyloxyalkyl, arylalkyl or aryl group; wherein each occurrence of R^i is independently hydrogen, CHO, $COOR^{ii}$, or a substituted or unsubstituted linear or branched chain alkyl, acyl, arylalkyl or aryl group or a saccharide moiety having the structure:



wherein Y and Z are independently NH or O; wherein k, l, r, s, t, u, v and w are each independently 0, 1 or 2; with the proviso that the v and w bracketed structures represent furanose or pyranose moieties and the sum of l and k is 1 or 2, and the sum of s and u is 1 or 2, and with the proviso that v and w are not simultaneously 0; wherein R'_9 is hydrogen, a linear or branched chain alkyl, acyl, arylalkyl or aryl group; wherein each occurrence of R_{10}, R_{11}, R_{12}, R_{13}, R_{14} and R_{15} is independently hydrogen, OH, OR^{iii}, NHR^{iii}, $NHCOR^{iii}$, F, CH_2OH, CH_2OR^{iii}, or a substituted or unsubstituted linear or branched chain alkyl, (mono-, di- or tri)hydroxyalkyl, (mono-, di- or tri)acyloxyalkyl, arylalkyl or aryl group; wherein each occurrence of R_{16} is hydrogen, COOH, $COOR^{iv}$, $CONHR^{iv}$, a substituted or unsubstituted linear or branched chain alkyl or aryl group; wherein each occurrence of R^{iii} is hydrogen, CHO, $COOR^{iv}$, or a substituted or unsubstituted linear or branched chain alkyl, acyl, arylalkyl or aryl group; and wherein each occurrence of R^{ii} and R^{iv}

are each independently H, or a substituted or unsubstituted linear or branched chain alkyl, arylalkyl or aryl group;

wherein the n-alkyl glycosidic moiety is either α- or β-linked to an amino acid.

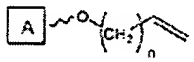
58. The glycopeptide of claim 56 or 57 wherein the glycopeptide is bound to a suitable carrier protein, peptide or lipid.

59. The glycopeptide of claim 58 wherein the carrier protein is bovine serum albumin, polylysine or keyhole limpet hemocyanin.

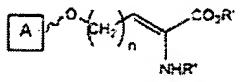
60. The glycopeptide of claim 58 wherein the lipid is tripalmitoyl-S-glycerylcysteinylserine.

61. The glycopeptide of claim 57 wherein the amino acids substituted with an n-alkyl glycosidic moiety are prepared by a process comprising steps of:

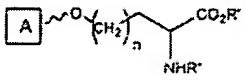
(a) providing an alkenyl glycoside having the structure:



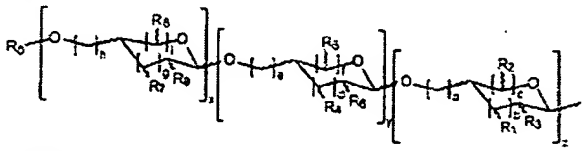
and reacting said alkenyl glycoside under suitable conditions to generate an enamide ester having the structure:



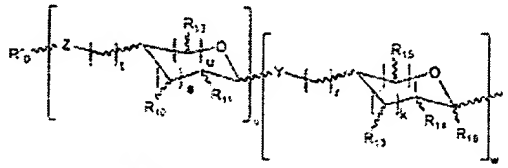
(b) reacting said enamide ester under suitable conditions to generate a glycoamino acid having the structure:



wherein, for each of the structures above, n is 0-9, wherein A is a carbohydrate domain having the structure:



wherein a, b, c, d, e, f, g, h, i, x, y and z are independently 0, 1, 2 or 3, with the proviso that the x, y and z bracketed structures represent furanose or pyranose moieties and the sum of b and c is 1 or 2, the sum of d and f is 1 or 2, and the sum of g and i is 1 or 2, and with the proviso that x, y and z are not simultaneously 0; wherein R_o is hydrogen, a linear or branched chain alkyl, acyl, arylalkyl or aryl group; wherein each occurrence of R_1, R_2, R_3, R_4, R_5, R_6, R_7, R_8 and R_9 is independently hydrogen, OH, OR^i, NHR^i, $NHCOR^i$, F, CH_2OH, CH_2OR^i, a substituted or unsubstituted linear or branched chain alkyl, (mono-, di- or tri)hydroxyalkyl, (mono-, di- or tri)acyloxyalkyl, arylalkyl or aryl group; wherein each occurrence of R' is independently hydrogen, CHO, $COOR^{ii}$, or a substituted or unsubstituted linear or branched chain alkyl, acyl, arylalkyl or aryl group or a saccharide moiety having the structure:

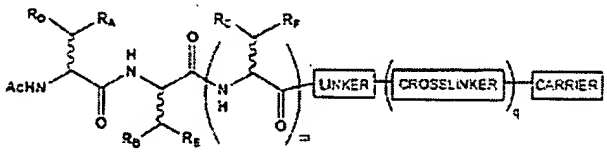


wherein Y and Z are independently NH or O; wherein k, l, r, s, t, u, v and w are each independently 0, 1 or 2; with the proviso that the v and w bracketed structures represent furanose or pyranose moieties and the sum of l and k is 1 or 2, and the sum of s and u is 1 or 2, and with the proviso that v and w are not simultaneously 0; wherein R'_o is hydrogen, a linear or branched chain alkyl, acyl, arylalkyl or aryl group; wherein each occurrence of R_{10}, R_{11}, R_{12}, R_{13}, R_{14} and R_{15} is independently hydrogen, OH, OR^{iii}, NHR^{iii}, $NHCOR^{iii}$, F, CH_2OH, CH_2OR^{iii}, or a substituted or unsubstituted linear or branched chain alkyl, (mono-, di- or tri)hydroxyalkyl, (mono-, di- or

ri)acyloxyalkyl, arylalkyl or aryl group; wherein each occurrence of R_{t6} is hydrogen, COOH, $COOR^{ii}$, $CONHR^{a}$, a substituted or unsubstituted linear or branched chain alkyl or aryl group; wherein each occurrence of R^{iii} is hydrogen, CHO, $COOR^{iv}$, or a substituted or unsubstituted linear or branched chain alkyl, acyl, arylalkyl or aryl group; and wherein each occurrence of R^{a} and R^{b} are each independently H, or a substituted or unsubstituted linear or branched chain alkyl, arylalkyl or aryl group;

and wherein for the glycoamino acid structure R' and R" are each independently protecting group or hydrogen.

62. The glycopeptide of claim 57, wherein said glycopeptide is a construct having the structure:



wherein the linker is either a free carboxylic acid, (carboxamido)alkyl carboxamide, MBS, primary carboxamide, mono- or dialkyl carboxamide, mono- or diarylcarboxamide, linear or branched chain (carboxy)alkyl carboxamide, linear or branched chain (alkoxycarbonyl)alkyl-carboxamide, linear or branched chain (carboxy)arylalkylcarboxamide, linear or branched chain (alkoxycarbonyl)alkylcarboxamide, an oligoester fragment comprising from 2 to about 20 hydroxy acyl residues, a peptidic fragment comprising from 2 to about 20 amino acyl residues, or a linear or branched chain alkyl or aryl carboxylic ester;

wherein the crosslinker is a moiety derived from a crosslinking reagent capable of conjugating a surface amine of the carrier with a terminal thiol of the linker;

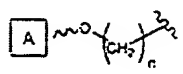
wherein the carrier is a protein or lipid;

wherein m is 1, 2, 3 or 4;

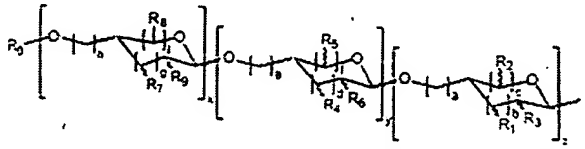
wherein q is 0 or 1;

wherein each occurrence of R_A, R_B and R_C is independently H or methyl; and

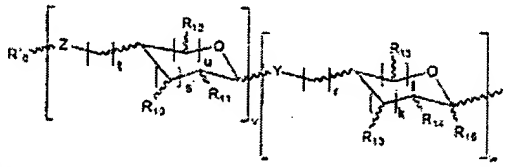
wherein each occurrence of R_D, R_E and R_F is independently an alkyl glycosidic moiety having the structure:



wherein each occurrence of A is independently selected from a carbohydrate domain having the structure:



wherein a, b, c, d, e, f, g, h, i, x, y and z are independently 0, 1, 2 or 3, with the proviso that R_D, R_E and R_F are carbohydrates independently comprised of furanose or pyranose moieties, and the sum of b and c is 1 or 2, the sum of d and f is 1 or 2, and the sum of g and i is 1 or 2, and with the proviso that x, y and z are not simultaneously 0; wherein R_D is hydrogen, a linear or branched chain alkyl, acyl, arylalkyl or aryl group; wherein each occurrence of R_1, R_2, R_3, R_4, R_5, R_6, R_7, R_8 and R_9 is independently hydrogen, OH, OR^i, NHR^i, $NHCOR^i$, F, CH_2OH, CH_2OR^i, a substituted or unsubstituted linear or branched chain alkyl, (mono-, di- or tri)hydroxyalkyl, (mono-, di- or tri)acyloxyalkyl, arylalkyl or aryl group; wherein each occurrence of R^i is independently hydrogen, CHO, $COOR^h$, or a substituted or unsubstituted linear or branched chain alkyl, acyl, arylalkyl or aryl group or a saccharide moiety having the structure:



wherein Y and Z are independently NH or O; wherein k, l, r, s, t, u, v and w are each independently 0, 1 or 2; with the proviso that the v and w bracketed structures represent furanose or pyranose moieties and the sum of l and k is 1 or 2, and the sum of s and u is 1 or 2, and with the

proviso that v and w are not simultaneously 0; wherein R'_9 is hydrogen, a linear or branched chain alkyl, acyl, arylalkyl or aryl group; wherein each occurrence of R_{10}, R_{11}, R_{12}, R_{13}, R_{14} and R_{15} is independently hydrogen, OH, OR^{iii}, NHR^{iii}, $NHCOR^{iii}$, F, CH_2OH, CH_2OR^{iii}, or a substituted or unsubstituted linear or branched chain alkyl, (mono-, di- or tri)hydroxyalkyl, (mono-, di- or tri)acyloxyalkyl, arylalkyl or aryl group; wherein each occurrence of R_{16} is hydrogen, COOH, $COOR^{iii}$, $CONHR^{iii}$, a substituted or unsubstituted linear or branched chain alkyl or aryl group; wherein each occurrence of R^{iii} is hydrogen, CHO, $COOR^{iv}$, or a substituted or unsubstituted linear or branched chain alkyl, acyl, arylalkyl or aryl group; and wherein each occurrence of R^{ii} and R^{iv} are each independently H, or a substituted or unsubstituted linear or branched chain alkyl, arylalkyl or aryl group;

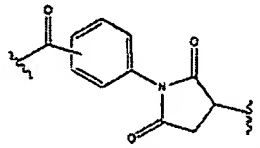
wherein each occurrence of n is independently 0-9, whereby, if for each occurrence of n, n = 0, at least one occurrence of A has a different structure from other occurrences of A; and wherein the n-alkyl glycosidic moiety is either α- or β-linked to an amino acid.

63. The construct of claim 62 wherein the linker is -O-, $-NR_C-$, $-NR_C$(aliphatic)NR_J-, $-NR_C$(heteroaliphatic)NR_J-, -(aliphatic)NR_J-, -(heteroaliphatic)NR_J-, -O(aliphatic)NR_J-, -O(heteroaliphatic)NR_J-, $-NR_C$(aliphatic)$NR_J(C=O)(CR_HR_I)_kS-$, $-NR_C$(heteroaliphatic)$NR_J(C=O)(CR_HR_I)_kS-$, -(aliphatic)$NR_J(C=O)(CR_HR_I)_kS-$, -(heteroaliphatic)$NR_J(C=O)(CR_HR_I)_kS-$, -O(aliphatic)$NR_J(C=O)(CR_HR_I)_kS-$, -O(heteroaliphatic)$NR_J(C=O)(CR_HR_I)_kS-$, an oligoester fragment comprising from 2 to about 20 hydroxy acyl residues, a peptidic fragment comprising from 2 to about 20 amino acyl residues, or a linear or branched chain alkyl or aryl carboxylic ester, wherein each occurrence of k is independently 1-5; wherein each occurrence of R_C, R_H, R_I or R_J is independently hydrogen, a linear or branched, substituted or unsubstituted, cyclic or acyclic moiety, or a substituted or unsubstituted aryl moiety, and wherein each aliphatic or heteroaliphatic moiety is independently substituted or unsubstituted, linear or branched, cyclic or acyclic.

64. The construct of claim 62, wherein the linker is -O-, $-NR_C(CR_HR_I)_kNR_J-$, $-NR_C(CR_HR_I)_kNR_J(C=O)(CR_HR_I)_kS-$, $-NR_C-$, $-(CR_HR_J)_kNR_J-$, $-O(CR_HR_I)_kNR_J$, an oligoester fragment comprising from 2 to about 20 hydroxy acyl residues, a peptidic fragment comprising from 2 to about 20 amino acyl residues, or a linear or branched chain alkyl or aryl carboxylic ester, wherein each occurrence of k is independently 1-5, wherein each occurrence of R_C, R_H, R_I or R_J is

independently hydrogen, a linear or branched, substituted or unsubstituted, cyclic or acyclic moiety, or a substituted or unsubstituted aryl moiety.

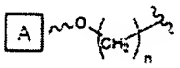
65. The construct of claim 62, wherein the crosslinker is a fragment having the structure:



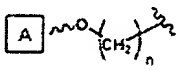
whereby said structure is generated upon conjugation of maleimidobenzoic acid N-hydroxy succinimide ester with a linker.

66. The construct of claim 62, wherein m is 1 and the construct has three occurrences of A comprising Tn, Globo-H and Le^y.

67. The glycopeptide of claim 57 wherein the glycopeptide has six occurrences of the alkyl glycosidic moiety having the structure:



68. The construct of claim 62, wherein m is 4 and the construct has six occurrences of the alkyl glycosidic moiety having the structure:

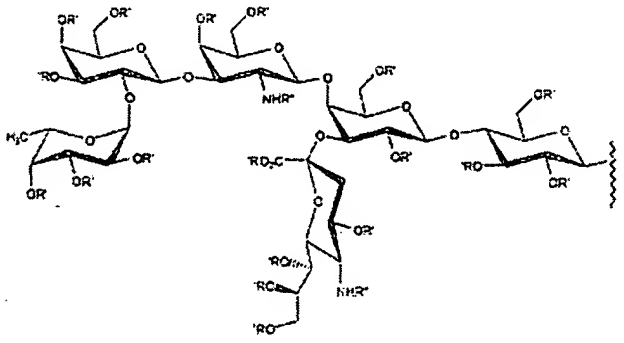


69. The glycopeptide of claim 57 or 67 or the construct of claim 62 or 68, wherein each occurrence of A is independently Globo-H, fucosyl GM1, KH-1, glycophorin, STN, Le^y, N3, Tn, 2,6-STn, (2,3)ST, or TF.

70. The construct of claim 62 or 68 wherein the carrier is bovine serum albumin, polylysine or keyhole limpet hemocyanin.

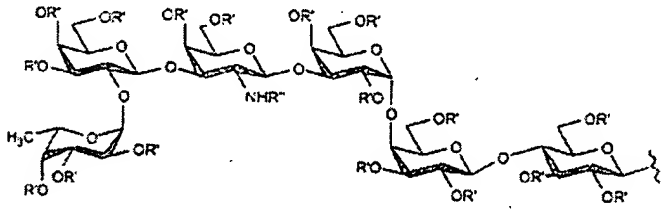
71. The construct of claim 62 or 68 wherein the carrier is tripalmitoyl-S-glycerylcysteinylserine.

72. The glycopeptide of claim 57 or 67 or the construct of claim 62 or 68, wherein at least one occurrence of A is a carbohydrate determinant having the structure:



wherein each occurrence of R' is independently hydrogen or a protecting group; and wherein each occurrence of R'' is independently hydrogen or a nitrogen protecting group.

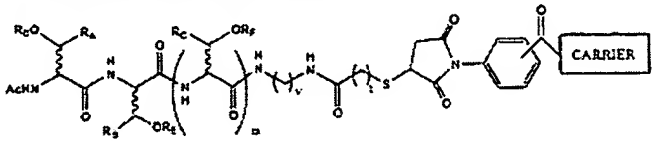
73. The glycopeptide of claim 57 or 67 or the construct of claim 62 or 68, wherein at least one occurrence of A is a carbohydrate determinant having the structure:



wherein each occurrence of R' is independently hydrogen or a protecting group; and

wherein R'' is hydrogen or a nitrogen protecting group.

74. The construct of claim 62 having the structure:



wherein R_A, R_B and R_C are each independently H or methyl;

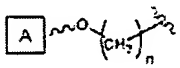
m is 1, 2, 3 or 4;

v is 1-8;

t is 1-8; and

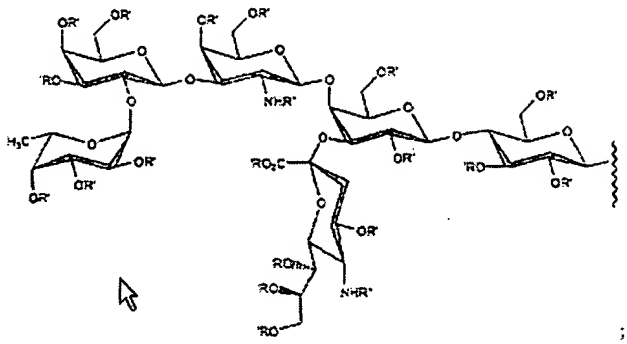
the carrier is a protein;

wherein each occurrence of R_D, R_E and R_F is independently an alkyl glycosidic moiety having the structure:

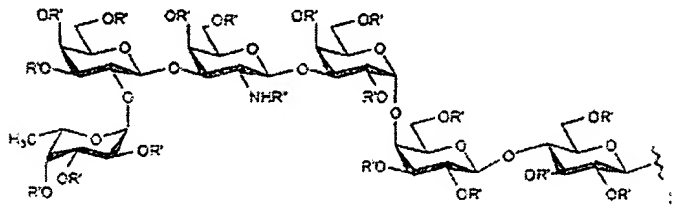


wherein n is 0-9;

each occurrence of A is independently a carbohydrate domain selected from the group consisting of Globo-H, fucosyl GM1, KH-1, glycophorin, STN, Le^y, N3, Tn, 2,6-STn, (2,3)ST, or TF, a carbohydrate domain having the structure:



or a carbohydrate domain having the structure:



wherein each occurrence of R' is independently hydrogen or a protecting group; and wherein R'' is hydrogen or a nitrogen protecting group

whereby, if for each occurrence of n, n = 0, at least one occurrence of A has a different structure from other occurrences of A; and wherein the n-alkyl glycosidic moiety is either α- or β-linked to an amino acid.

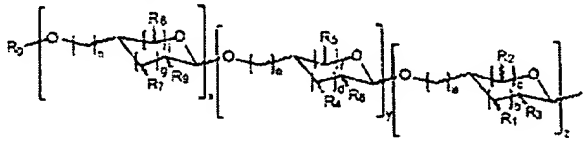
75. The construct of claim 74, wherein the protein is bovine serum albumin, polylysine or keyhole limpet hemocyanin.

76. A pharmaceutical composition comprising:

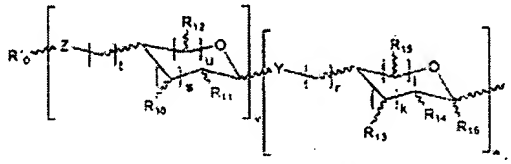
one or more immunological adjuvants and/or a pharmaceutically suitable carrier; and

a multi-antigenic glycopeptide comprising a peptidic backbone made up of two or more amino acids, wherein each of said amino acids is independently substituted with a glycosidic moiety having the structure:

wherein the linker is a substituted or unsubstituted aliphatic or heteroaliphatic moiety; each occurrence of A is a carbohydrate determinant having the structure:



wherein a, b, c, d, e, f, g, h, i, x, y and z are independently 0, 1, 2 or 3, with the proviso that the x, y and z bracketed structures represent furanose or pyranose moieties and the sum of b and c is 1 or 2, the sum of d and f is 1 or 2, and the sum of g and i is 1 or 2, and with the proviso that x, y and z are not simultaneously 0; wherein R_0 is hydrogen, a linear or branched chain alkyl, acyl, arylalkyl or aryl group; wherein each occurrence of R_1, R_2, R_3, R_4, R_5, R_6, R_7, R_8 and R_9 is independently hydrogen, OH, OR^i, NHR^i, $NHCOR^i$, F, CH_2OH, CH_2OR^i, a substituted or unsubstituted linear or branched chain alkyl, (mono-, di- or tri)hydroxyalkyl, (mono-, di- or tri)acyloxyalkyl, arylalkyl or aryl group; wherein each occurrence of R^i is independently hydrogen, CHO, $COOR^{ii}$, or a substituted or unsubstituted linear or branched chain alkyl, acyl, arylalkyl or aryl group or a saccharide moiety having the structure:

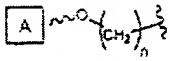


wherein Y and Z are independently NH or O; wherein k, l, r, s, t, u, v and w are each

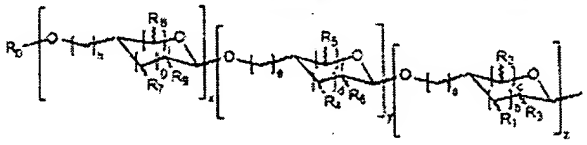
independently 0, 1 or 2; with the proviso that the v and w bracketed structures represent furanose or pyranose moieties and the sum of l and k is 1 or 2, and the sum of s and u is 1 or 2, and with the proviso that v and w are not simultaneously 0; wherein R_9 is hydrogen, a linear or branched chain alkyl, acyl, arylalkyl or aryl group; wherein each occurrence of R_{10}, R_{11}, R_{12}, R_{13}, R_{14} and R_{15} is independently hydrogen, OH, OR^{iii}, NHR^{iii}, $NHCOR^{iii}$, F, CH_2OH, CH_2OR^{iii}, or a substituted or unsubstituted linear or branched chain alkyl, (mono-, di- or tri)hydroxyalkyl, (mono-, di- or tri)acyloxyalkyl, arylalkyl or aryl group; wherein each occurrence of R_{16} is hydrogen, COOH, $COOR^{ii}$, $CONHR^{ii}$, a substituted or unsubstituted linear or branched chain alkyl or aryl group; wherein each occurrence of R^{iii} is hydrogen, CHO, $COOR^{iv}$, or a substituted or unsubstituted linear or branched chain alkyl, acyl, arylalkyl or aryl group; and wherein each occurrence of R^{ii} and R^{iv} are each independently H, or a substituted or unsubstituted linear or branched chain alkyl, arylalkyl or aryl group;

wherein each occurrence of n is independently 0-9, whereby, if for each occurrence of n, n = 0, at least one occurrence of A has a different structure from other occurrences of A.

77. The pharmaceutical composition of claim 76 wherein one or more of said amino acids are substituted with an n-alkyl glycosidic moiety having the structure:

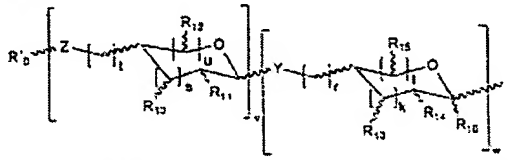


wherein each occurrence of A is a carbohydrate determinant having the structure:



wherein a, b, c, d, e, f, g, h, i, x, y and z are independently 0, 1, 2 or 3, with the proviso that the x, y and z bracketed structures represent furanose or pyranose moieties and the sum of b and c is 1 or 2, the sum of d and f is 1 or 2, and the sum of g and i is 1 or 2, and with the proviso that x, y and z are not simultaneously 0; wherein R_0 is hydrogen, a linear or branched chain alkyl, acyl, arylalkyl or aryl group; wherein each occurrence of R_1, R_2, R_3, R_4, R_5, R_6, R_7, R_8 and R_9 is independently hydrogen, OH, OR^i, NHR^i, $NHCOR^i$, F, CH_2OH, CH_2OR^i, a substituted or unsubstituted linear or branched chain alkyl, (mono-, di- or tri)hydroxyalkyl, (mono-, di- or

tri)acyloxyalkyl, arylalkyl or aryl group; wherein each occurrence of R^i is independently hydrogen, CHO, $COOR^{ii}$, or a substituted or unsubstituted linear or branched chain alkyl, acyl, arylalkyl or aryl group or a saccharide moiety having the structure:



wherein Y and Z are independently NH or O; wherein k, l, r, s, t, u, v and w are each independently 0, 1 or 2; with the proviso that the v and w bracketed structures represent furanose or pyranose moieties and the sum of l and k is 1 or 2, and the sum of s and u is 1 or 2, and with the proviso that v and w are not simultaneously 0; wherein R'_9 is hydrogen, a linear or branched chain alkyl, acyl, arylalkyl or aryl group; wherein each occurrence of R_{10}, R_{11}, R_{12}, R_{13}, R_{14} and R_{15} is independently hydrogen, OH, OR^{iii}, NHR^{iii}, $NHCOR^{iii}$, F, CH_2OH, CH_2OR^{iii}, or a substituted or unsubstituted linear or branched chain alkyl, (mono-, di- or tri)hydroxyalkyl, (mono-, di- or tri)acyloxyalkyl, arylalkyl or aryl group; wherein each occurrence of R_{16} is hydrogen, COOH, $COOR^{ii}$, $CONHR^{ii}$, a substituted or unsubstituted linear or branched chain alkyl or aryl group; wherein each occurrence of R^{iii} is hydrogen, CHO, $COOR^{iv}$, or a substituted or unsubstituted linear or branched chain alkyl, acyl, arylalkyl or aryl group; and wherein each occurrence of R^{iv} and $R^{iv'}$ are each independently H, or a substituted or unsubstituted linear or branched chain alkyl, arylalkyl or aryl group;

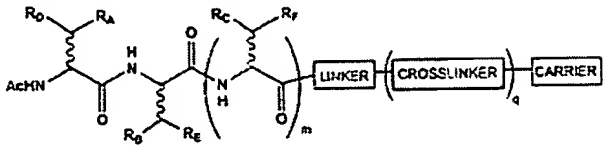
wherein the n-alkyl glycosidic moiety is either α- or β-linked to an amino acid.

78. The pharmaceutical composition of claim 76 or 77 wherein the glycopeptide is bound to a suitable carrier protein or lipid.

79. The pharmaceutical composition of claim 78 wherein the carrier protein is bovine serum albumin, polylysine or keyhole limpet hemocyanin.

80. The pharmaceutical composition of claim 78 wherein the lipid is tripalmitoyl-S-glycerylcysteinylserine.

81. The pharmaceutical composition of claim 77, wherein said glycopeptide is a construct having the structure:



wherein the linker is either a free carboxylic acid, (carboxamido)alkyl carboxamide, MBS, primary carboxamide, mono- or dialkyl carboxamide, mono- or diarylcarboxamide, linear or branched chain (carboxy)alkyl carboxamide, linear or branched chain (alkoxycarbonyl)alkyl-carboxamide, linear or branched chain (carboxyjarylalkylcarboxamide, linear or branched chain (alkoxycarbonyl)alkylcarboxamide, an oligoester fragment comprising from 2 to about 20 hydroxy acyl residues, a peptidic fragment comprising from 2 to about 20 amino acyl residues, or a linear or branched chain alkyl or aryl carboxylic ester;

wherein the crosslinker is a moiety derived from a crosslinking reagent capable of conjugating a surface amine of the carrier with a terminal thiol of the linker;

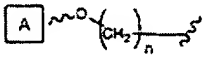
wherein the carrier is a protein or lipid;

wherein m is 1, 2, 3 or 4;

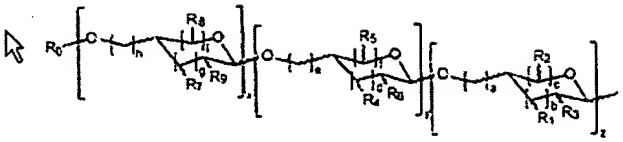
wherein q is 0 or 1;

wherein each occurrence of R_A, R_B and R_C is independently H or methyl; and

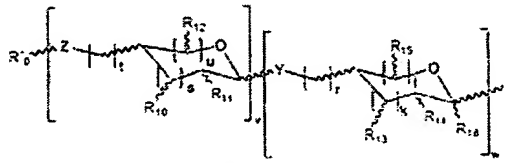
wherein each occurrence of R_D, R_E and R_F is independently an alkyl glycosidic moiety having the structure:



wherein each occurrence of A is independently selected from a carbohydrate domain having the structure:



wherein a, b, c, d, e, f, g, h, i, x, y and z are independently 0, 1, 2 or 3, with the proviso that R_D, R_E and R_F are carbohydrates independently comprised of furanose or pyranose moieties, and the sum of b and c is 1 or 2, the sum of d and f is 1 or 2, and the sum of g and i is 1 or 2, and with the proviso that x, y and z are not simultaneously 0; wherein R_0 is hydrogen, a linear or branched chain alkyl, acyl, arylalkyl or aryl group; wherein each occurrence of R_1, R_2, R_3, R_4, R_5, R_6, R_7, R_8 and R_9 is independently hydrogen, OH, OR^i, NHR^i, $NHCOR^i$, F, CH_2OH, CH_2OR^i, a substituted or unsubstituted linear or branched chain alkyl, (mono-, di- or tri)hydroxyalkyl, (mono-, di- or tri)acyloxyalkyl, arylalkyl or aryl group; wherein each occurrence of R^i is independently hydrogen, CHO, $COOR^{ii}$, or a substituted or unsubstituted linear or branched chain alkyl, acyl, arylalkyl or aryl group or a saccharide moiety having the structure:



wherein Y and Z are independently NH or O; wherein k, l, r, s, t, u, v and w are each independently 0, 1 or 2; with the proviso that the v and w bracketed structures represent furanose or pyranose moieties and the sum of l and k is 1 or 2, and the sum of s and u is 1 or 2, and with the proviso that v and w are not simultaneously 0; wherein R'_0 is hydrogen, a linear or branched chain alkyl, acyl, arylalkyl or aryl group; wherein each occurrence of R_{10}, R_{11}, R_{12}, R_{13}, R_{14} and R_{15} is independently hydrogen, OH, OR^{ii}, NHR^{ii}, $NHCOR^{ii}$, F, CH_2OH, CH_2OR^{ii}, or a substituted or unsubstituted linear or branched chain alkyl, (mono-, di- or tri)hydroxyalkyl, (mono-, di- or tri)acyloxyalkyl, arylalkyl or aryl group; wherein each occurrence of R_{16} is hydrogen, COOH, $COOR^{ii}$, $CONHR^{ii}$, a substituted or unsubstituted linear or branched chain alkyl or aryl group;

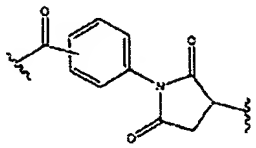
wherein each occurrence of R^{iii} is hydrogen, CHO, $COOR^{iv}$, or a substituted or unsubstituted linear or branched chain alkyl, acyl, arylalkyl or aryl group; and wherein each occurrence of R^{ii} and R^{iv} are each independently H, or a substituted or unsubstituted linear or branched chain alkyl, arylalkyl or aryl group;

wherein each occurrence of n is independently 0-9, whereby, if for each occurrence of n, n = 0, at least one occurrence of A has a different structure from other occurrences of A; and wherein the n-alkyl glycosidic moiety is either α- or β-linked to an amino acid.

82. The pharmaceutical composition of claim 81 wherein the linker is -O-, -NR_{F}-, -NR_{G}(aliphatic)NR_{F}-, -NR_{G}(heteroaliphatic)NR_{F}-, -(aliphatic)NR_{F}-, -(heteroaliphatic)NR_{F}-, -O(aliphatic)NR_{F}-, -O(heteroaliphatic)NR_{F}-, -NR_{G}(aliphatic)NR_{J}(C=O)$(CR_{H}R_{I})_{k}$S-, -NR_{G}(heteroaliphatic)NR_{J}(C=O)$(CR_{H}R_{I})_{k}$S-, -(aliphatic)NR_{J}(C=O)$(CR_{H}R_{I})_{k}$S-, -(heteroaliphatic)NR_{J}(C=O)$(CR_{H}R_{I})_{k}$S-, -O(aliphatic)NR_{J}(C=O)$(CR_{H}R_{I})_{k}$S-, -O(heteroaliphatic)NR_{J}(C=O)$(CR_{H}R_{I})_{k}$S-, an oligoester fragment comprising from 2 to about 20 hydroxy acyl residues, a peptidic fragment comprising from 2 to about 20 amino acyl residues, or a linear or branched chain alkyl or aryl carboxylic ester, wherein each occurrence of k is independently 1-5; wherein each occurrence of R_{G}, R_{H}, R_{I} or R_{J} is independently hydrogen, a linear or branched, substituted or unsubstituted, cyclic or acyclic moiety, or a substituted or unsubstituted aryl moiety, and wherein each aliphatic or heteroaliphatic moiety is independently substituted or unsubstituted, linear or branched, cyclic or acyclic.

83. The pharmaceutical composition of claim 81, wherein the linker is -O-, -$NR_{G}(CR_{H}R_{I})_{k}NR_{F}$-, -$NR_{G}(CR_{H}R_{I})_{k}NR_{J}$(C=O)$(CR_{H}R_{I})_{k}$S-, -$NR_{G}$-, -$(CR_{H}R_{J})_{k}NR_{F}$-, -$O(CR_{H}R_{I})_{k}NR_{I}$, an oligoester fragment comprising from 2 to about 20 hydroxy acyl residues, a peptidic fragment comprising from 2 to about 20 amino acyl residues, or a linear or branched chain alkyl or aryl carboxylic ester, wherein each occurrence of k is independently 1-5, wherein each occurrence of R_{G}, R_{H}, R_{I} or R_{J} is independently hydrogen, a linear or branched, substituted or unsubstituted, cyclic or acyclic moiety, or a substituted or unsubstituted aryl moiety.

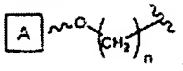
84. The pharmaceutical composition of claim 81, wherein the crosslinker is a fragment having the structure:



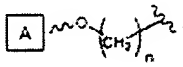
whereby said structure is generated upon conjugation of maleimidobenzoic acid N-hydroxy succinimide ester with a linker.

85. The pharmaceutical composition of claim 81, wherein m is 1 and the construct has three occurrences of A comprising Tn, Globo-H and Le^y.

86. The pharmaceutical composition of claim 77, wherein the glycopeptide has six occurrences of the alkyl glycosidic moiety having the structure:



87. The pharmaceutical composition of claim 81, wherein m is 4 and the construct has six occurrences of the alkyl glycosidic moiety having the structure:

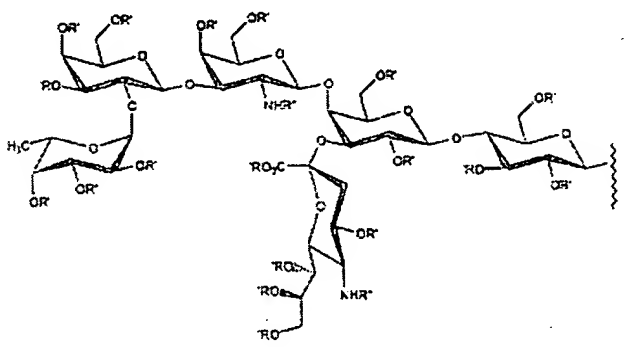


88. The pharmaceutical composition of claim 77, 81, 85 or 86, wherein each occurrence of A is independently Globo-H, fucosyl GM1, KH-1, glycophorin, STN, Le^y, N3, Tn, 2,6-STn, (2,3)ST, or TF.

89. The pharmaceutical composition of claim 81 or 86 wherein the carrier is bovine serum albumin, polylysine or keyhole limpet hemocyanin.

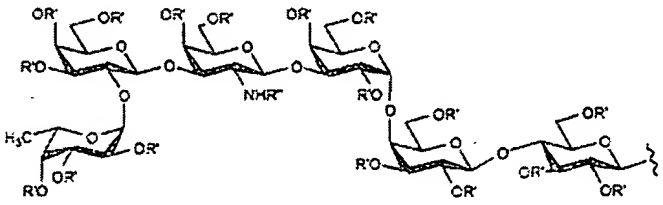
90. The pharmaceutical composition of claim 81 or 86 wherein the carrier is tripalmitoyl-S-glycerylcysteinylserine.

91. The pharmaceutical composition of claim 77, 81, 85 or 86, wherein at least one occurrence of A is a carbohydrate determinant having the structure:



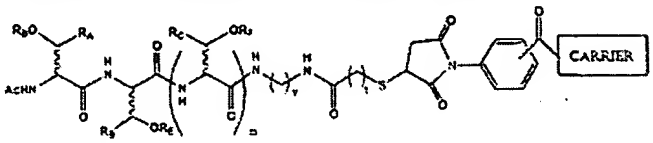
wherein each occurrence of R' is independently hydrogen or a protecting group; and wherein each occurrence of R'' is independently hydrogen or a nitrogen protecting group.

92. The pharmaceutical composition of claim 77, 81, 85 or 86, wherein at least one occurrence of A is a carbohydrate determinant having the structure:



wherein each occurrence of R' is independently hydrogen or a protecting group; and wherein R'' is hydrogen or a nitrogen protecting group.

93. The pharmaceutical composition of claim 80, wherein the construct has the structure:



wherein R_A, R_B and R_C are each independently H or methyl;

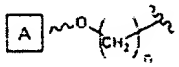
m is 1, 2, 3 or 4;

v is 1-8;

t is 1-8; and

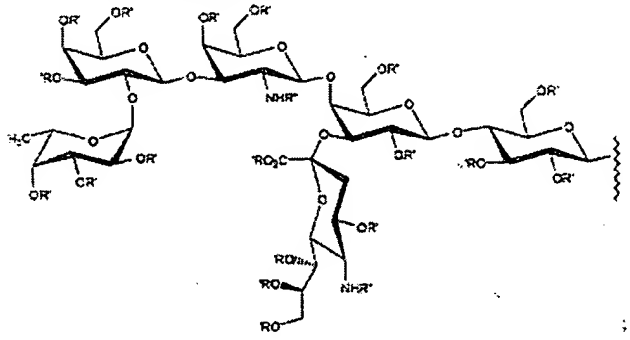
the carrier is a protein;

wherein each occurrence of R_D, R_E and R_F is independently an alkyl glycosidic moiety having the structure:

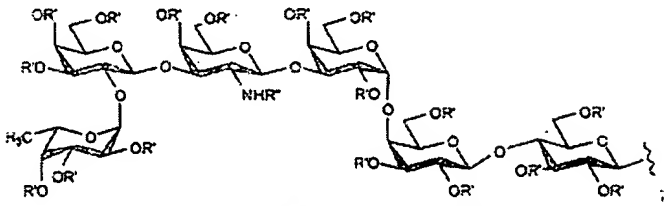


wherein n is 0-9;

each occurrence of A is independently a carbohydrate domain selected from the group consisting of Globo-H, fucosyl GM1, KH-1, glycophorin, STN, Le^y, N3, Tn, 2,6-ST, (2,3)ST, or TF, a carbohydrate domain having the structure:



or a carbohydrate domain having the structure:



wherein each occurrence of R' is independently hydrogen or a protecting group; and wherein R'' is hydrogen or a nitrogen protecting group

whereby, if for each occurrence of n, n = 0, at least one occurrence of A has a different structure from other occurrences of A; and wherein the n-alkyl glycosidic moiety is either α- or β-linked to an amino acid.

94. The pharmaceutical composition of claim 93, wherein the protein is bovine serum albumin, polylysine or keyhole limpet hemocyanin.

95. The pharmaceutical composition of claim 77 wherein at least one of said one or more immunological adjuvants is a saponin adjuvant.

96. The pharmaceutical composition of claim 95 wherein the saponin adjuvant is GPI-0100.

97. The pharmaceutical composition of claim 77 wherein at least one of said one or more immunological adjuvants is bacteria or liposomes.

98. The pharmaceutical composition of claim 97 wherein the immunological adjuvant is Salmonella minnesota cells, bacille Calmette-Guerin or QS21.